SOLUTION BY ELIZABETH BROWN DAVIS, U. S. Naval Observatory.

Let BCD be the given isosceles triangle; A, its area; $2b$ its base; $2a$ its altitude; and c each of its equal sides. Then by the conditions of the problem

$$2c = 2a + 2b, \qquad \text{or} \qquad c = a + b.$$

Also,

$$(2a)^2 + b^2 = c^2 = (a + b)^2;$$

whence

$$3a^2 + 2ab = A,$$

and $a = \frac{1}{3}\sqrt{3A}$. Hence, $2a = \frac{2}{3}\sqrt{3A} =$ altitude. Since $2ab = 3a^2$, $b = \frac{3}{2}a = \frac{1}{2}\sqrt{3A}$; $2b = \sqrt{3A} =$ the base; and $c = a + b = \frac{5}{6}\sqrt{3A} =$ the length of the equal sides.

Also solved by C. E. GITHENS, ELBERT H. CLARKE, A. M. HARDING, A. H. HOLMES, WALTER C. EELLS, H. C. FEEMSTER, HORACE OLSON, GEORGE Y. SOSNOW, and NATHAN ALTSHILLER.

CALCULUS.

364. Proposed by EMMA GIBSON, Drury College.

Solve the differential equation

$$(xp - y)^2 = a(1 + p^2)(x^2 + y^2)^{3/2}, \text{ where } p = \frac{dy}{ax}.$$

I. SOLUTION BY GEO. W. HARTWELL, Hamline University.

Let $v = \frac{y}{x}$ and $u^2 = x^2 + y^2$.

The equation then takes such form that the variables can be separated and we have

$$\frac{dv}{1 + v^2} = \frac{\sqrt{a}\, du}{\sqrt{u - au^2}}.$$

Integrating,

$$\tan^{-1} v + c = \cos^{-1}(1 - 2au) = \operatorname{vers}^{-1} 2au.$$

$$\therefore\ \tan^{-1}\frac{y}{x} + c = \operatorname{vers}^{-1} 2a\sqrt{x^2 + y^2}.$$

II. SOLUTION BY C. C. STECK, New Hampshire College, Durham, N. H.

If we put $x = r\cos\theta$ and $y = r\sin\theta$ in the given equation we get

$$d\theta = \frac{adr}{\sqrt{ar - a^2r^2}}.$$

Integrating this we have

$$\theta + c = \text{arc vers } 2ar.$$

Whence,

$$\text{arc tan}\frac{y}{x} + c = \text{arc vers } 2a\sqrt{x^2 + y^2}.$$

Solved similarly by A. M. HARDING, C. N. SCHMALL, ELMER SCHUYLER, and LEROY COFFIN.